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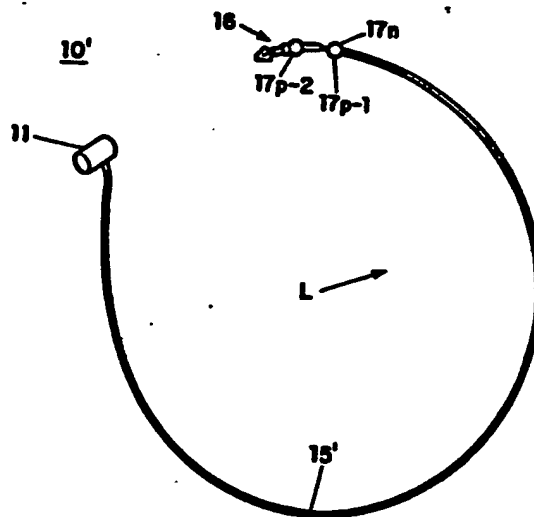
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(54) Title: FASTENER



(57) Abstract

A fastener formed by an elongated member with an apertured tip (16), such as a filamentary string (15) that is attached to a bidirectional locking head (11) with longitudinally opposed openings (C1, C2). The elongated member is inserted into either of the opposed openings (C1, C2) of the head (11), where it is engaged and locked in place by an internal, at least partially circumferentially ring (11r). Once the apertured tip (16) is inserted into the locking head (11), it remains in its locking position even if the filamentary string (15) becomes separated from it as a result, for example, of pilferage.

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FASTENER

BACKGROUND OF THE INVENTION

This invention relates to the fastening of objects, either together or one to another, and more particularly, to the secure, simplified fastening of objects.

Devices which are used to fasten objects typically make use of a strap connected to a locking head. The free end of the strap is threaded through or around the objects to be fastened and then inserted into the head.

In order to achieve secure fastening and prevent unauthorized tampering, the locking head generally is in the form of an enclosure that houses a locking tang and prevents unauthorized access to it. Such a housing is typically mechanically complex, and the strap must be inserted in a particular way. This detracts from the efficiency of the fastener. It is necessary to provide instructions for use of the fastener, and the user needs to be certain that the strap is properly inserted into the locking head.

Furthermore, the inserted end of the strap often tends to have a relatively massive configuration in order to achieve the desired locking effect. This makes the usual protected locking head fastener undesirable in use, for example, with control tags for items of merchandise. The massivity of the strap might damage the merchandise or leave an unsightly hole.

Another difficulty encountered with protected head fasteners is that the locking tang is a relatively weak member that can become separated from its position of connection to the head.

Accordingly, it is an object of the invention to achieve the secure fastening of objects without the need for special instructions in the use of the fastener. A related object is to facilitate the proper insertion of



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the free end of a strap into its locking head.

Another related object is to achieve a locking head fastener that is able to accommodate the free end of its strap in a number of different ways. Another

5 related object is to achieve a locking head fastener in which the strap can be used bidirectionally.

A further object of the invention is to achieve a fastener in which the strap that is inserted into a locking head does not require massive proportions to
10 achieve the desired locking effect.

It is still another object of the invention to achieve a fastener with a durable locking mechanism that is easy to use and not likely to be damaged.

Still another object of the invention is to avoid
15 the need for movable fingers, either in the socket of the fastener or on the head that is inserted into the socket.

A further object of the invention is to provide a security fastener which cannot be reused in the event
20 of pilferage. A related object is to produce a blockage of the socket to prevent reuse of the fastener in the event of pilferage.



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SUMMARY OF THE INVENTION

In accomplishing the foregoing and related objects, the invention provides a fastener in which an apertured elongated member with a weakened region is attached by a strip or strap to an apertured housing that serves as a locking head and is provided with an apertured tip that is lockably inserted into the head.

In accordance with one aspect of the invention, the housing is open at opposed ends, and the locking mechanism is formed by an internal circumferential ring that can be partially open. The locking ring is able to receive, in either direction of insertion, the apertured free end of the elongated member.

In accordance with another aspect of the invention, fixed locking vanes are positioned oppositely on the apertured tip of the elongated member.

In accordance with another aspect of the invention, the aperture in the tip is in the form of a double wedge, each with diverging sides that meet at a central position so that the maximum opening of the aperture is at an intermediate location along the length of the tip. The fixed locking vanes or ramps on the tip desirably terminate at the position of maximum opening of the aperture and include surfaces that diverge from the tip end to surfaces that are able to engage the internal locking ring of the housing. This engagement causes the ramps to be compressed towards one another and permit the tip to enter into the housing beyond the locking ring, after which the ramps expand and lock the tip securely into position within the housing.

In accordance with a still further aspect of the invention, the ramp effect facilitates the proper insertion of the free end of the elongated member into the apertured housing.



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In accordance with yet another aspect of the invention, the apertured tip, when locked in the housing, produces an irremovable blockage of the entry into the housing, so that if the filamentary
5 strip or strap is pulled from the tip, the fastener cannot be reused. This provides security and prevents reuse of the fastener in the event of pilferage or in case of an unauthorized attempt to remove the tip from its locked position in order to reattach the fastener
10 in an unauthorized fashion.



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BRIEF DESCRIPTION OF THE DRAWINGS

Other aspects of the invention will become apparent after considering several illustrative embodiments taken in conjunction with the drawings in which:

5 FIGURE 1A is a perspective view of an extended fastener in accordance with the invention, before stretching of its connecting filament;

10 FIGURE 1B is a perspective view of the fastener of FIGURE 1A after stretching of its filament showing the tip end in position for being inserted into the head;

FIGURE 2A is an enlarged plan view of the tip portion of the fastener of FIGURES 1A and 1B;

15 FIGURE 2B is a cross sectional view of the tip of FIGURE 2A;

FIGURE 2C is a top view of the tip portion of FIGURE 2A;

FIGURE 3A is a cross-sectional view of the housing of the fastener shown in FIGURES 1A and 1B;

20 FIGURE 3B is an end view of the housing of FIGURE 3;

FIGURE 4A is an enlarged plan view of the tip portion of an alternative fastener in accordance with the invention;

25 FIGURE 4B is a partial cross sectional view illustrating the insertion of the alternative fastener of FIGURE 4A into the housing of FIGURE 3A and the additional safeguard against accidental removal provided by the alternative fastener;

30 FIGURE 5A is an enlarged plan view of the tip portion of a further alternative embodiment of the invention; and

35 FIGURE 5B is a partial sectional view illustrating the effect of an attempted withdrawal of the alternative fastener of FIGURE 5A once inserted into the housing of FIGURE 3A.



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DETAILED DESCRIPTION

With reference to the drawings, FIGURE 1 shows a fastener in accordance with the invention before elongation of its central filamentary portion 15. The fastener 10 additionally includes an apertured housing 11 in the form of a cylindrical locking head with longitudinally opposed circular openings C_1 and C_2 . The elongated member 15 is centrally attached to the housing 11 and has a free end or apertured tongue 16 that is inserted into one of the circular openings C_1 and C_2 , to become irremovably locked in the housing 11.

The fastener 10 is customarily produced by molding of a stretch reorientable plastic material, such as polypropylene, nylon and the like. After molding has been completed the fastener is in the form shown in FIGURE 1A with a thickened filamentary portion 15, and a connecting portion 17. After the fastener 10 is removed from its mold, the filamentary portion 15 is elongated by stretching, for example by gripping the locking head or housing 11 in a jaw (not shown) and simultaneously gripping the end of the filament 15 by a protuberance 17 p-1 and drawing the jaws apart.

The result of the stretching operation produces the modified fastener 10' of FIGURE 1B in which the central filamentary portion 15 of FIGURE 1A has become extended into an elongated and comparatively thinner filament 15' that extends between the housing or head 11 and the tip 16 by way of the connection portions 17. In addition, the connecting portion includes a neck 17n of reduced cross section which provides a breakage point in case of an unauthorized tampering with the device 10'.

In particular FIGURE 1B shows the elongated filament 15' positioned in the form of a loop L with the tip 16 in position for being inserted into the locking head 11. The locking ring 11r can be provided with openings 11-o in order to permit some compression and facilitate entry of the tip 16 into the housing 11.



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Details of the apertured tip 16 which bring about the desired locking engagement in the housing 11 are illustrated in FIGURE 2A.

The tip 16 of FIGURE 2A includes an end 16e in the form of an aperture cylinder 16c. The aperture is a double wedge opening 16w with a first opening having diverging upper and lower surfaces 16w-1 and 16w-2 that diverge from a radius of curvature 16c-1. The balance of the opening 16w is formed by oppositely diverging wedge surfaces 16w-3 and 16w-4 that diverge from an end radius of curvature 16c-2. The extremities of the wedge meet at the midsection of the cylindrical tip. Straddling the first portion of the wedge are oppositely positioned ramps 16r-1 and 16r-2. As indicated in FIGURES 2B and 2C the ramps 16r-1 and 16r-2 have planar outer surfaces and converge at the extreme tip 16t of the free member. They diverge outwardly to surfaces 16p-1 and 16p-2 with a curvature conforming to the underlying tip 16c.

The locking head 11 which receives the tip 16 is shown in section in FIGURE 3A. Upon insertion of the tip 16 into either open end C_1 or C_2 of the head 11 the ramps 16r-1 and 16r-2 engage the inner surface of an internal ring 11r. Further movement of the tip into the housing 11 compresses the ramps into the double wedge opening 16n. Complete movement of the tip into the housing results in clearance of the ring 11r by the trailing vertical extremities 16r-1 and 16r-2 of the ramps which thereupon spring back into their equilibrium position, locking the tip 16 against the opposite sides 11s-1 or 11s-2 of the locking ring 11r.

It is to be noted further that in addition to the protuberance 17p-1 there is a further protuberance 17p-2 at the end of the connector 17. This latter protuberance is designed to facilitate the insertion of the tip 16 into the locking head 11 by providing a convenient gripping point for the user. To that end the



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gripping protuberance 17p-2 is in the form of a partial sphere which is joined to a cylindrical embossment 16r. The further protuberance 17p-1 which is at the terminus of the reduced diameter neck 17n provides a convenient rupture point in the event of unauthorized tampering with the device, resulting in a fracture of the neck 17n at the protuberance 17p-1. Such tampering could result, for example, if a purchaser attempted to remove the locked fastener from an item of merchandise by pulling on the extended filament 15' because the tip 16 becomes locked in the housing 11 upon insertion to the point that the end of the cylindrical embossment 16r contacts one of the sides 11s-1 or 11s-2 of the locking ring 11r. When the embossment is thus positioned, the vertical ends 16v-1 and 16v-2 of the ramps 16r-1 and 16r-2 engage the other side surface 11s-2 or 11s-1 of the locking ring 11r. Consequently, in this situation, if an attempt is made to pull the tip 16 from the housing 11, any failure of the fastener will take place at the reduced diameter neck 17n and the apertured tip that has become separated from the filament 15' remains in blocking position in the housing 11. This prevents any attempted reuse of the fastener and constitutes a security measure against unauthorized tampering and pilferage.

An alternative tip 56 is illustrated in FIGURE 5A. By contrast with the tip 16 of FIGURE 2A the tip 56 of FIGURE 5A includes a double wedge opening 56w which is asymmetric. In the case of FIGURE 2A the aperture 16w is formed by two wedge openings which are symmetrically disposed with respect to the ends 16 v-1 and 16 v-2 of the ramps 16 r-1 and 16 r-2. In the case of the tip 56 in FIGURE 4A the two wedge openings which form the aperture 56w are unequal and intersect before the inclined ends 56 v-1 and 56 v-2 of the ramps 56 r-1 and 56 r-2. At the intersection position along an axis I the walls 57 w-1 and 57 w-2 are of reduced



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thickness in order to promote flexure of the end 56e in accordance with FIGURE 4B.

As indicated in FIGURE 4B, once the tip 56 is inserted into the housing 11 the ramp walls 56 v-1 and 56 v-2 engage the inclined side surface 11' s-1 of the locking ring 11'r. If an attempt is made to remove the tip 56 by pushing on the end 56e is pushed inwardly and flexes about the axis I. This forces the side surfaces of the end against the corresponding inner walls of the housing 11. The result is to thwart attempts to make an unauthorized removal of the tip 56 from the housing 11.

In addition the nose portion of the end 56e is formed as a plug 56p with a concave end 56c so that unauthorized forces that are slightly displaced from the central axis of the housing 11 will also bring about the desired flexure of the depressed plug 56p against the internal side walls of the housing.

A further embodiment is shown in FIGURE 5A in which the axis I' of minimal wall thickness is displaced inwardly towards the ring 56'r with respect to the walls 56' v-1 and 56' v-2 of the tip 56'e. This has the effect, as illustrated in FIGURE 5B, of bringing about the rupture separation of the end 56'e from the remainder of the tip 56 when excessive pulling force is applied in the direction indicated by the arrow P'. In order to prevent further useage of the tip 56' once rupture has taken place as shown in FIGURE 5B, the ring 56' is reduced in diameter compared with FIGURE 4A so that severed portions 56's cannot remain in the housing 11 once rupture has taken place as shown in FIGURE 5B.

Since the tip 56' includes the weakened regions 57' w-1 and 57' w-2, it is not necessary to include neck 17n of reduced cross section shown in FIGURE 1B.



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While various aspects of the invention have been set forth by the drawings and specification, it is to be understood that the foregoing detailed description is for illustration only and that various changes, as well as the substitution of equivalent constituents shown and described may be made without departing from the spirit and scope of the invention as set forth in the appended claims.



I CLAIM:

1. A fastener comprising
an elongated member having an apertured free end
with a weakened region;
an apertured housing connected to the other end of
said elongated member for receiving the free end there-
of; and
means in said housing for receiving and compress-
ing said free end about the aperture therein in order
to lock said elongated member in said housing.
2. A fastener as defined in claim 1 wherein said
housing is open at opposed ends thereof to permit the
bidirectional entry of said elongated member therein.
3. A fastener as defined in claim 1 wherein the
locking means comprises a circumferential ring in said
housing, which can form a plurality of discrete seg-
ments, each with a tapered wall, and further including
a means associated with said elongated member for guid-
ing it into said housing, which can comprise a ramp on
said free end terminating in a curved surface with
ramps on opposite sides thereof.
4. A fastener as defined in claim 1 wherein said
aperture in said tip is an elongated slot, which can
have an interior profile defined by back-to-back wedges.
5. A fastener as defined in claim 1 wherein said
tip has its minimum wall thickness at the intersection
of said wedges.
6. A fastener as defined in claim 4 wherein said
slot has its maximum width at midlength, and said slot
can be asymmetric.

7. A fastener comprising
an elongated member having an apertured free end
with a weakened region;

an apertured housing connected to the other end
of said elongated member for receiving the free end
thereof;

means in said housing for receiving and compress-
ing said free end about the aperture therein in order
to lock said elongated member in said housing; and

means on said free end positioned out of align-
ment with said weakened region for engaging the receiv-
ing and expressing means.

8. A fastener as defined in claim 7 wherein said
weakened region is closer to the end of said member
than the engaging means, thereby to hinder the un-
authorized removal of said member from said housing
after being engaged therein.

9. A fastener as defined in claim 7 wherein the
engaging means is closer to the end of said member
than said weakened region.

10. A fastener comprising an elongated member
having a free end with an aperture therein, said aper-
ture extending along the axis of elongation of said
member and being surrounded by a wall of said free end
which has a weakened region with respect to said
aperture;

an apertured housing connected to the other end
of said elongated member and receiving the free end
therein; and

means in said housing for receiving and compress-
ing said end at said weakened region in order to lock
said elongated member in said housing;

whereby the inclusion of said weakened region in
the wall surrounding the aperture of said tip facili-
tates the compression of said tip in said housing.



FIG. 1A

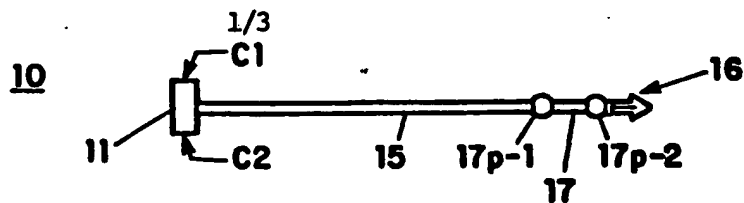


FIG. 1B

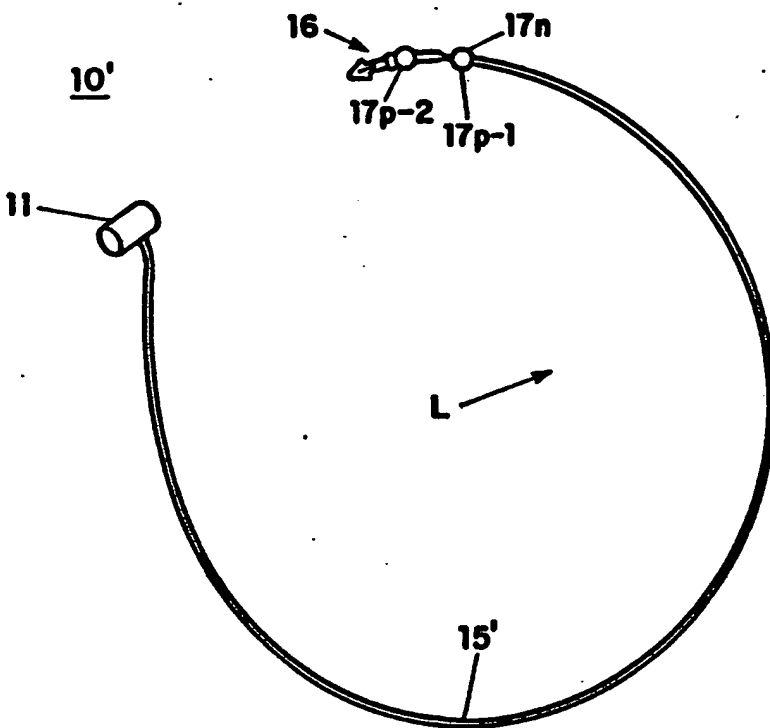


FIG. 2A

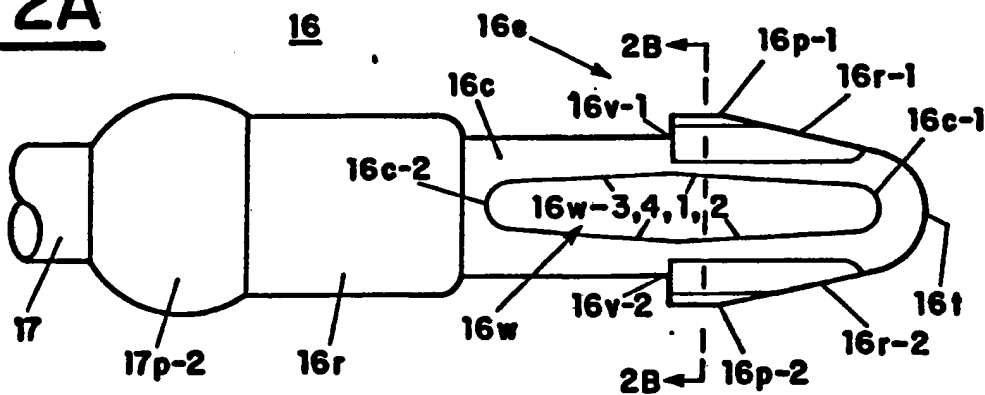


FIG. 2B

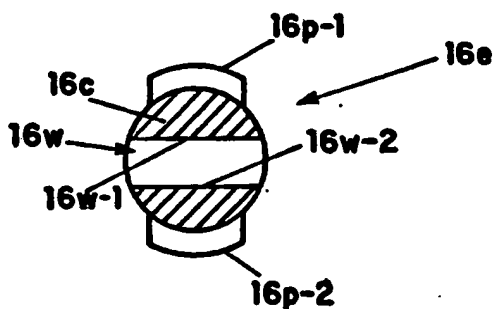


FIG. 2C

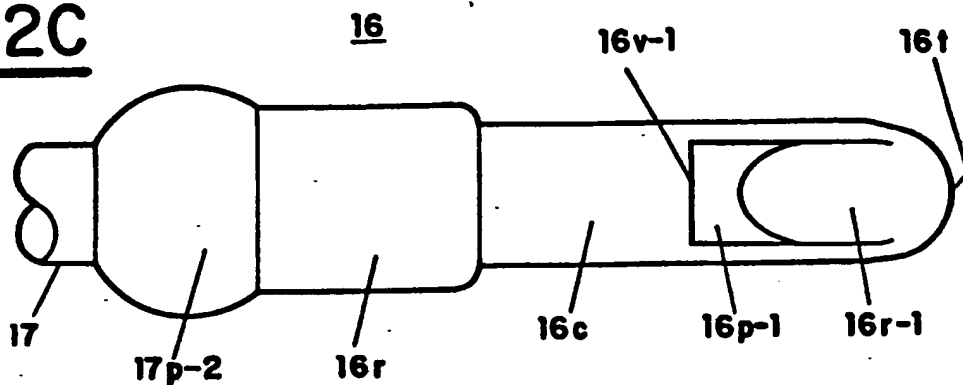


FIG. 3A

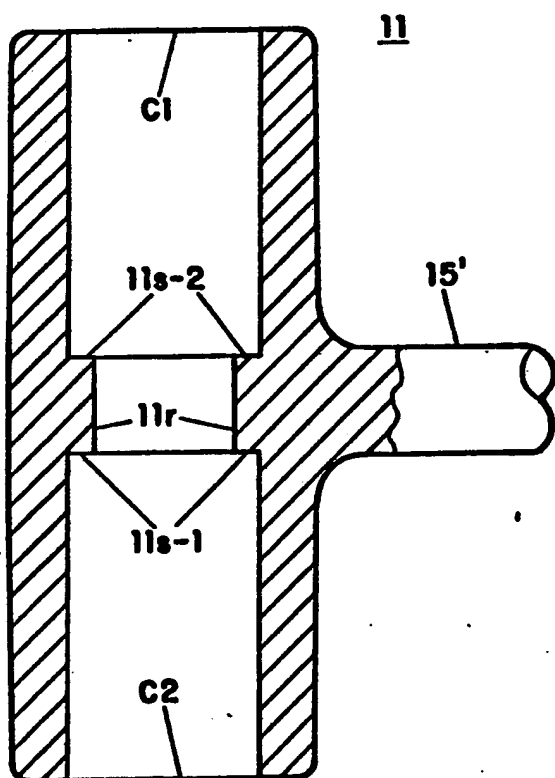


FIG. 3B

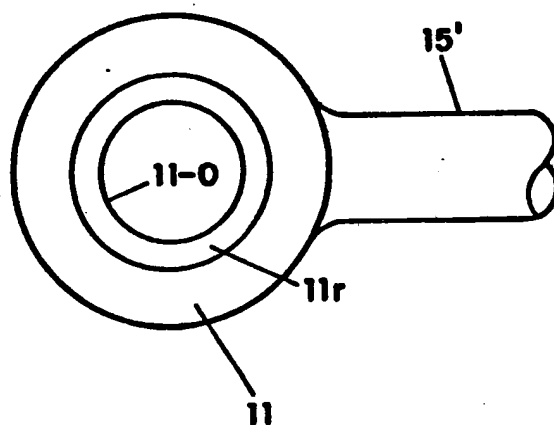


FIG. 4A

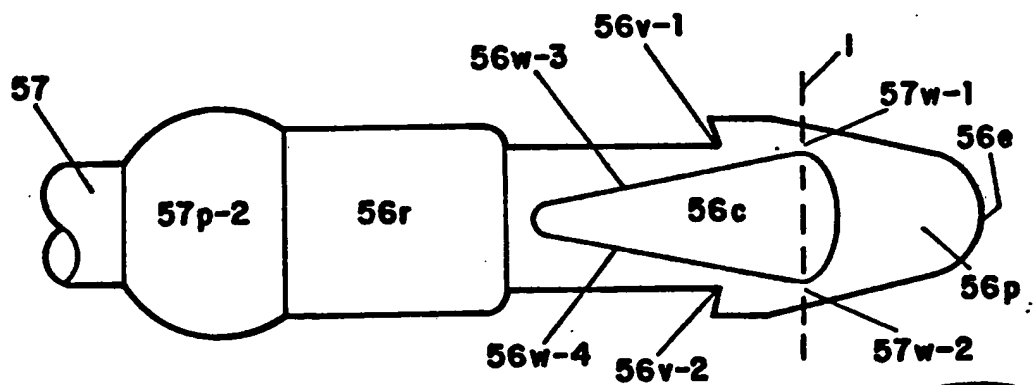


FIG. 4B

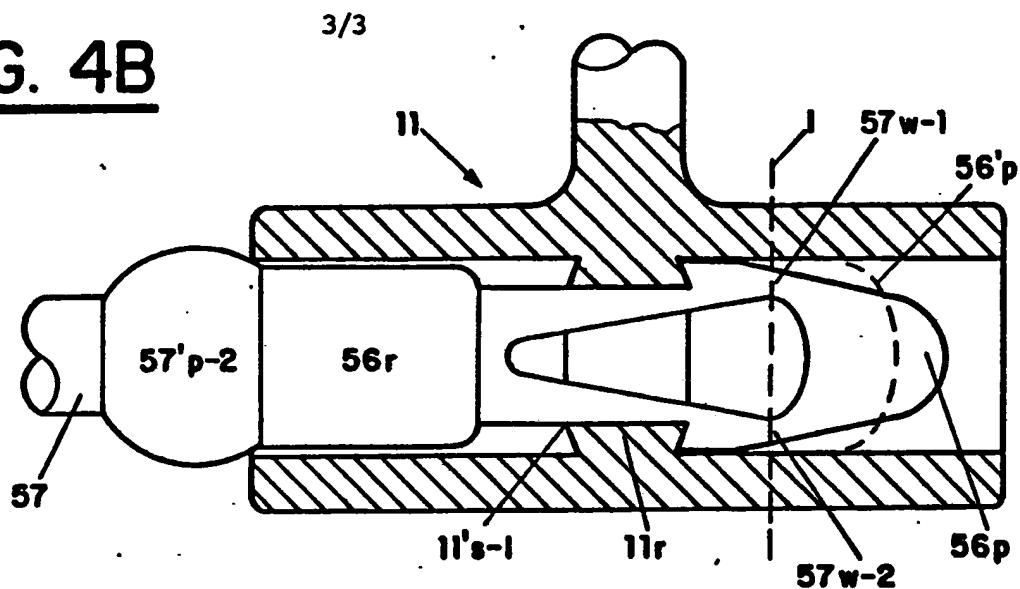


FIG. 5A

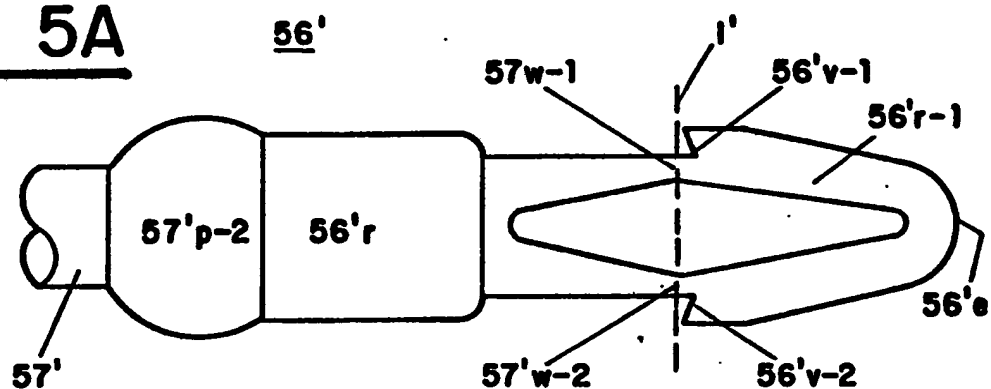
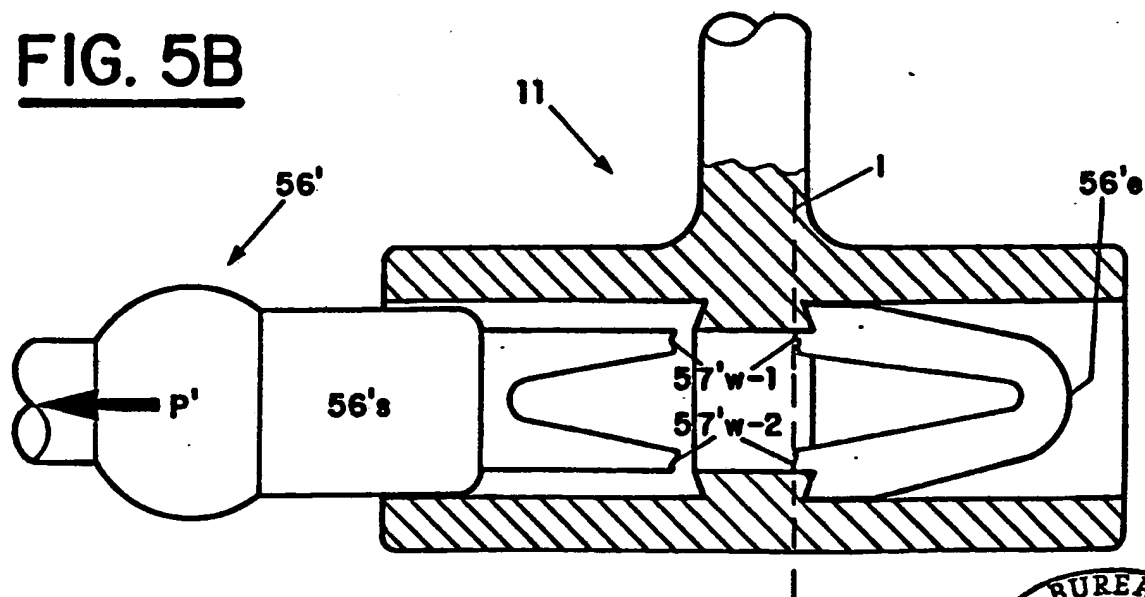


FIG. 5B



INTERNATIONAL SEARCH REPORT

International Application No PCT/US 84/00746

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int. Cl. ³ B65D 33/34		
U.S. Cl. 292/319, 320; 24/16PB, 30.5P, 704		
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Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁵		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category ⁶	Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
A	US, A, 3,367,701, published 06 February 1968, Wenk, Jr.	3
A	US, A, 3,600,027, published 17 August 1971, Noland et al.	1
Y	US, A, 3,718,355, published 27 February 1973, Canter	1,2,4-10
A	US, A, 3,816,879, published 18 June 1974, Merseer et al.	1
A	US, A, 4,059,300, published 22 November 1977, Moberg et al.	3
Y	US, A, 4,106,802, published 15 August 1978, Lozio	1,2,4-10
Y	US, A, 4,240,183, published 23 December 1980, Sumimoto et al	3
A	US, A, 4,245,374, published 20 January 1981, Suzuki	3
P	US, A, 4,441,233, published 10 April 1984, Swift	1
A	FR, A, 1,075,876, published 20 October 1954, Guesnu et al.	4
Y	DE, A, 1,536,205, published 15 January 1970, Nysten	1,2,4-10
A	GB, A, 2,025,856, published 30 January 1980, Coleing	1,3,6
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search ¹⁹	Date of Mailing of this International Search Report ²⁰	
12 July 1984	17 JUL 1984	
International Searching Authority ¹	Signature of Authorized Officer ²⁰	
ISA/US	James R. Brittain	